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Akhond et al.

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(54) **METHOD AND APPARATUS FOR RELAYING EVENTS INTENDED FOR A FIRST APPLICATION PROGRAM TO A SECOND APPLICATION PROGRAM**

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(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Under 35 U.S.C. 154(b), the term of this patent shall be extended for 0 days.

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(51) **Int. Cl.**[7] **G06F 9/00**; G06F 9/46; G06F 15/163

(52) **U.S. Cl.** **709/318**

(58) **Field of Search** 395/616, 604, 395/346, 677, 200.04, 615, 680; 345/335; 709/245

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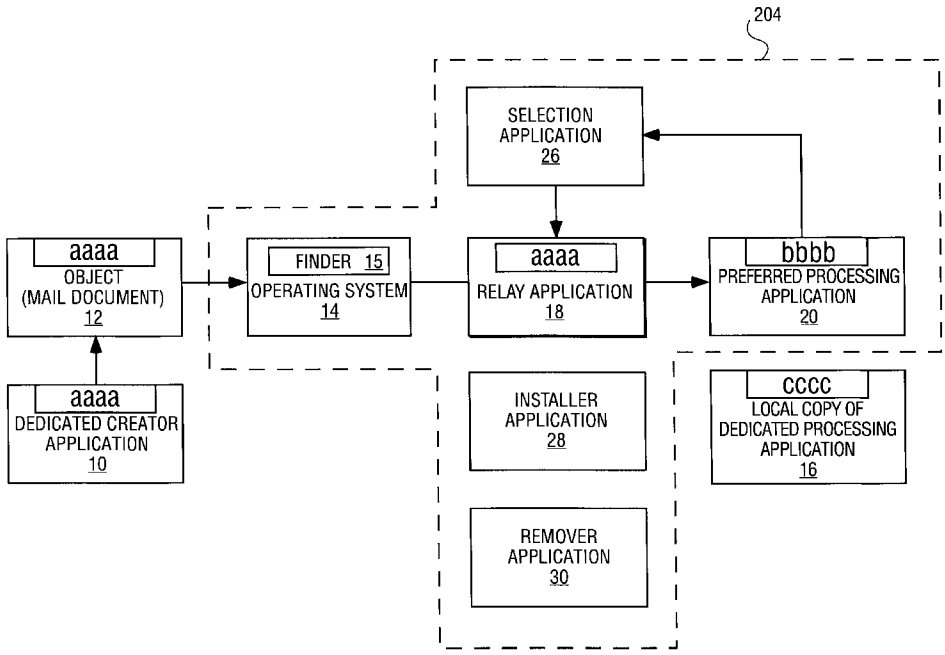
(57) **ABSTRACT**

A method and apparatus for processing with a preferred processing application having a preferred identifier, an event associated with an object created by a dedicated creator application is provided. The method includes the steps of receiving the event, intercepting the event with a relay application program, and forwarding, with the relay application program, the intercepted event to the preferred processing application program.

9 Claims, 11 Drawing Sheets


204
SELECTION APPLICATION 26
aaaa OBJECT (MAIL DOCUMENT) 12
FINDER 15 OPERATING SYSTEM 14
aaaa RELAY APPLICATION 18
bbbb PREFERRED PROCESSING APPLICATION 20
aaaa DEDICATED CREATOR APPLICATION 10
INSTALLER APPLICATION 28
CCCC LOCAL COPY OF DEDICATED PROCESSING APPLICATION 16
REMOVER APPLICATION 30

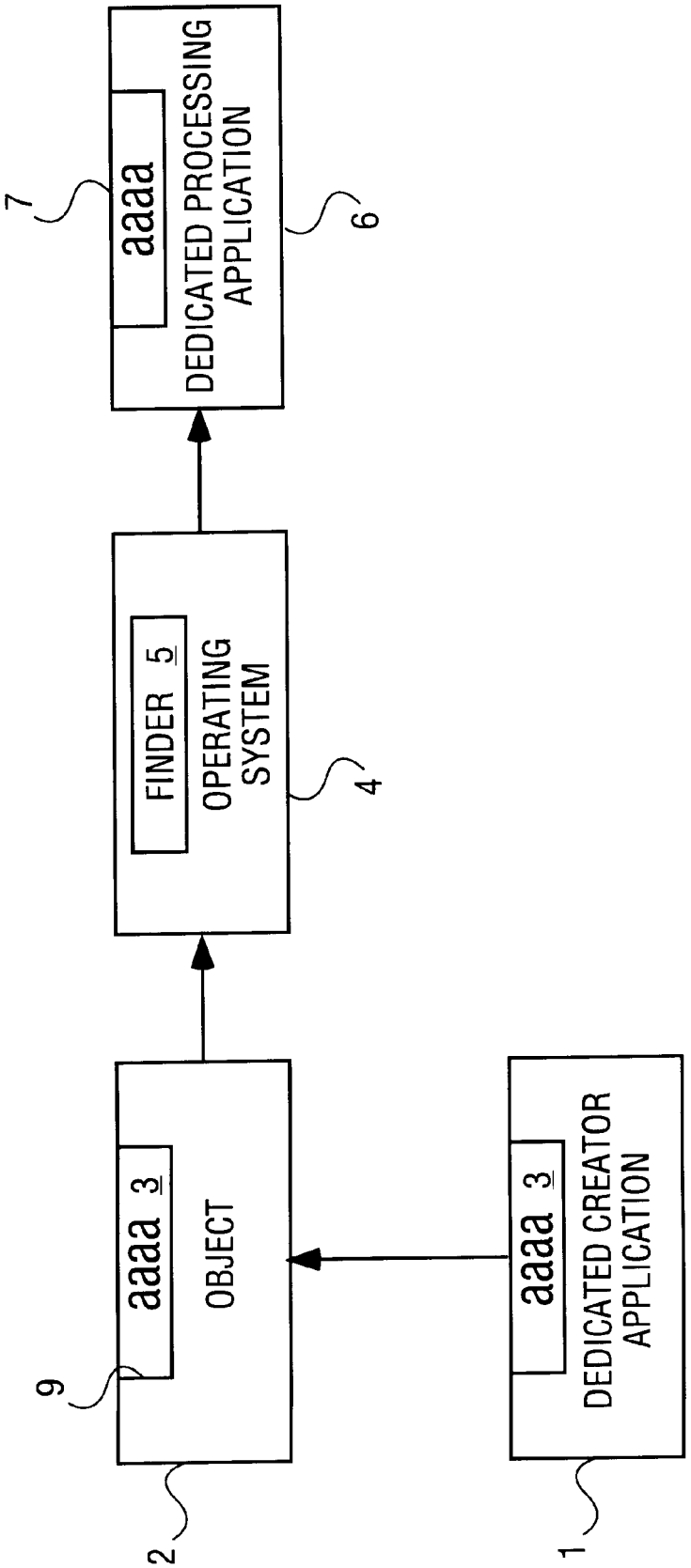


FIG. 1
(PRIOR ART)

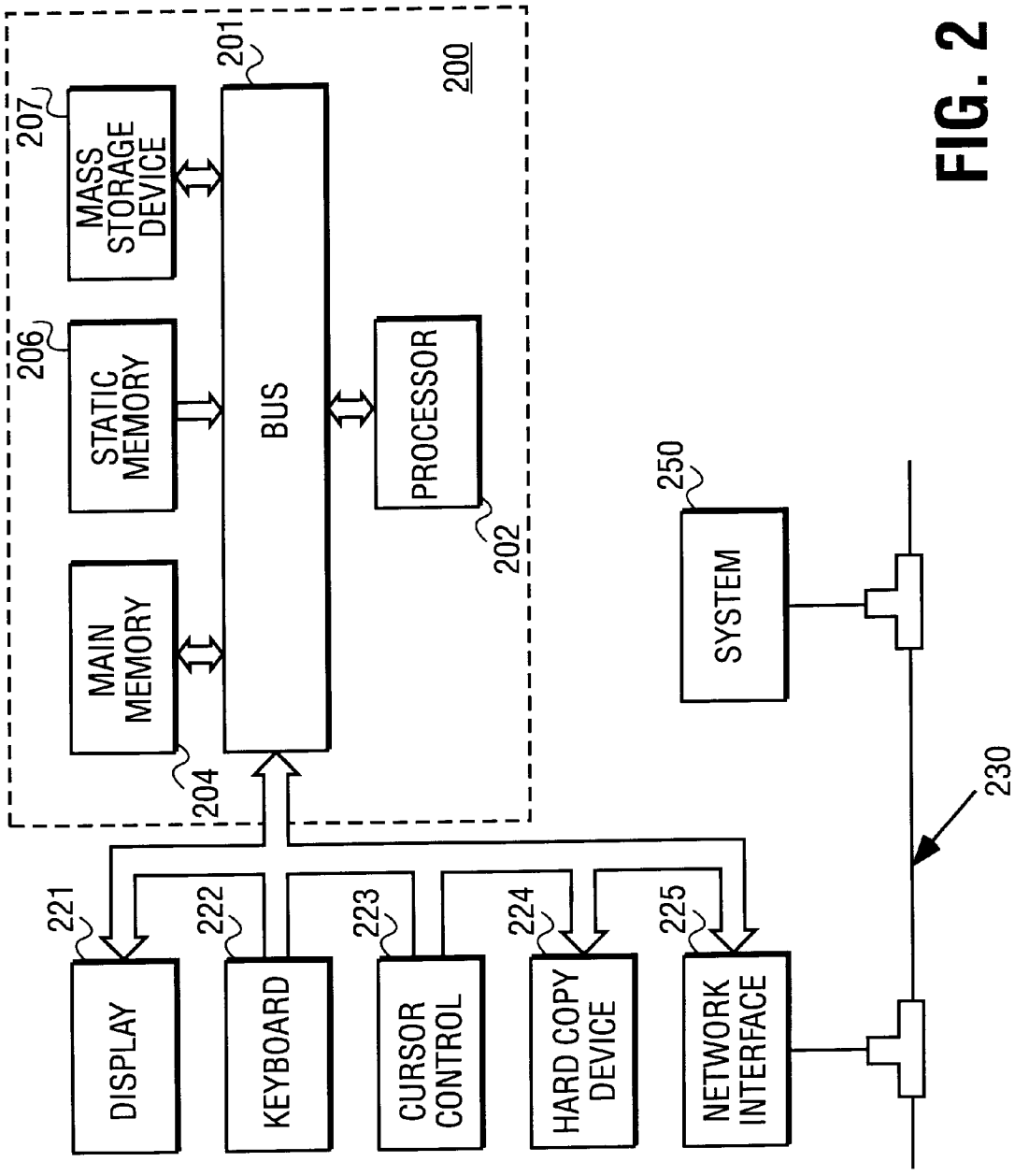

200
201
BUS
207
MASS STORAGE DEVICE
206
STATIC MEMORY
MAIN MEMORY
204
PROCESSOR
202
250
SYSTEM
230
221
DISPLAY
222
KEYBOARD
223
CURSOR CONTROL
224
HARD COPY DEVICE
225
NETWORK INTERFACE

FIG. 2

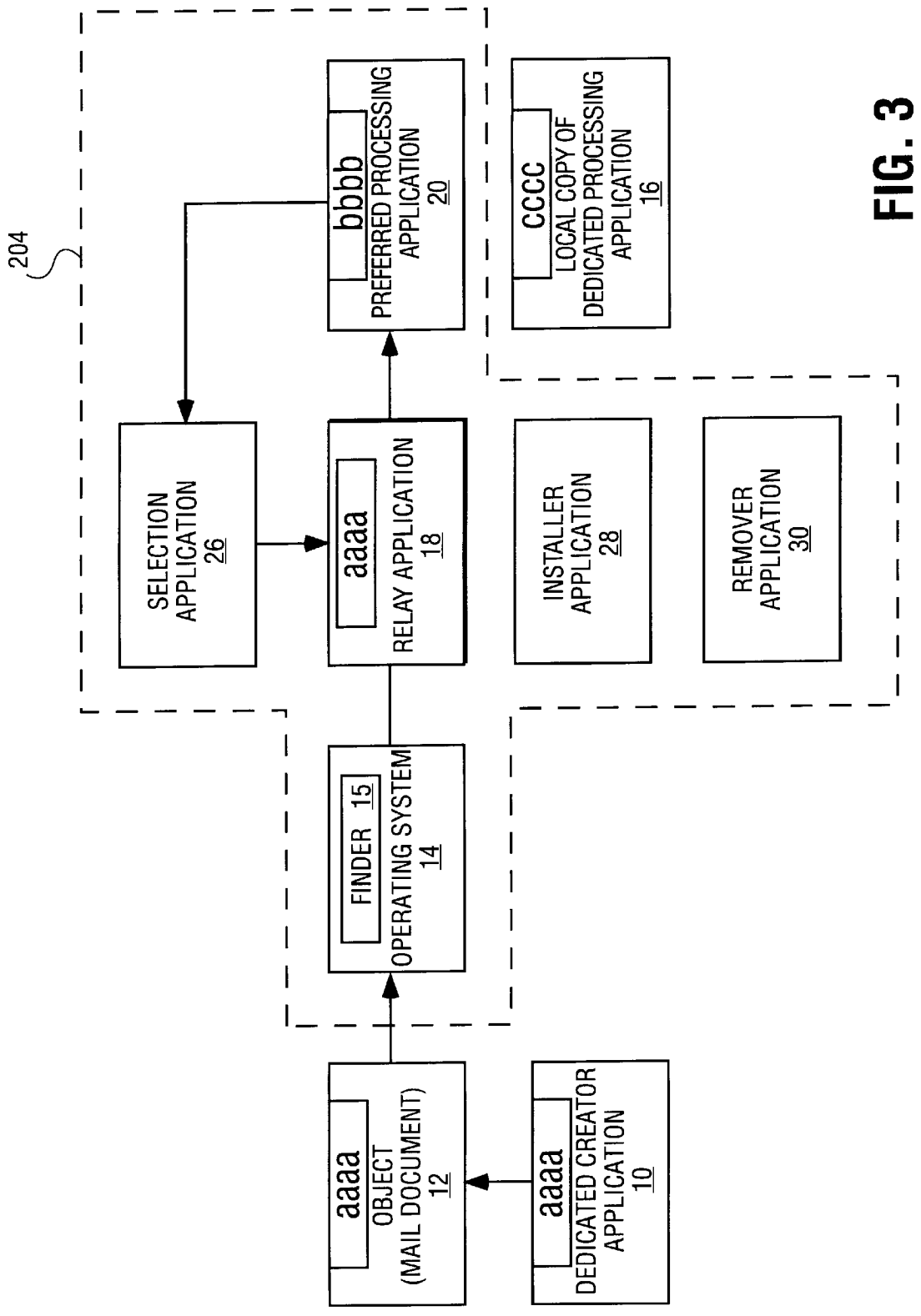

204
bbbb
PREFERRED PROCESSING APPLICATION 20
CCCC
LOCAL COPY OF DEDICATED PROCESSING APPLICATION 16
SELECTION APPLICATION 26
aaaa
RELAY APPLICATION 18
INSTALLER APPLICATION 28
REMOVER APPLICATION 30
FINDER 15
OPERATING SYSTEM 14
aaaa
OBJECT (MAIL DOCUMENT) 12
aaaa
DEDICATED CREATOR APPLICATION 10

FIG. 3

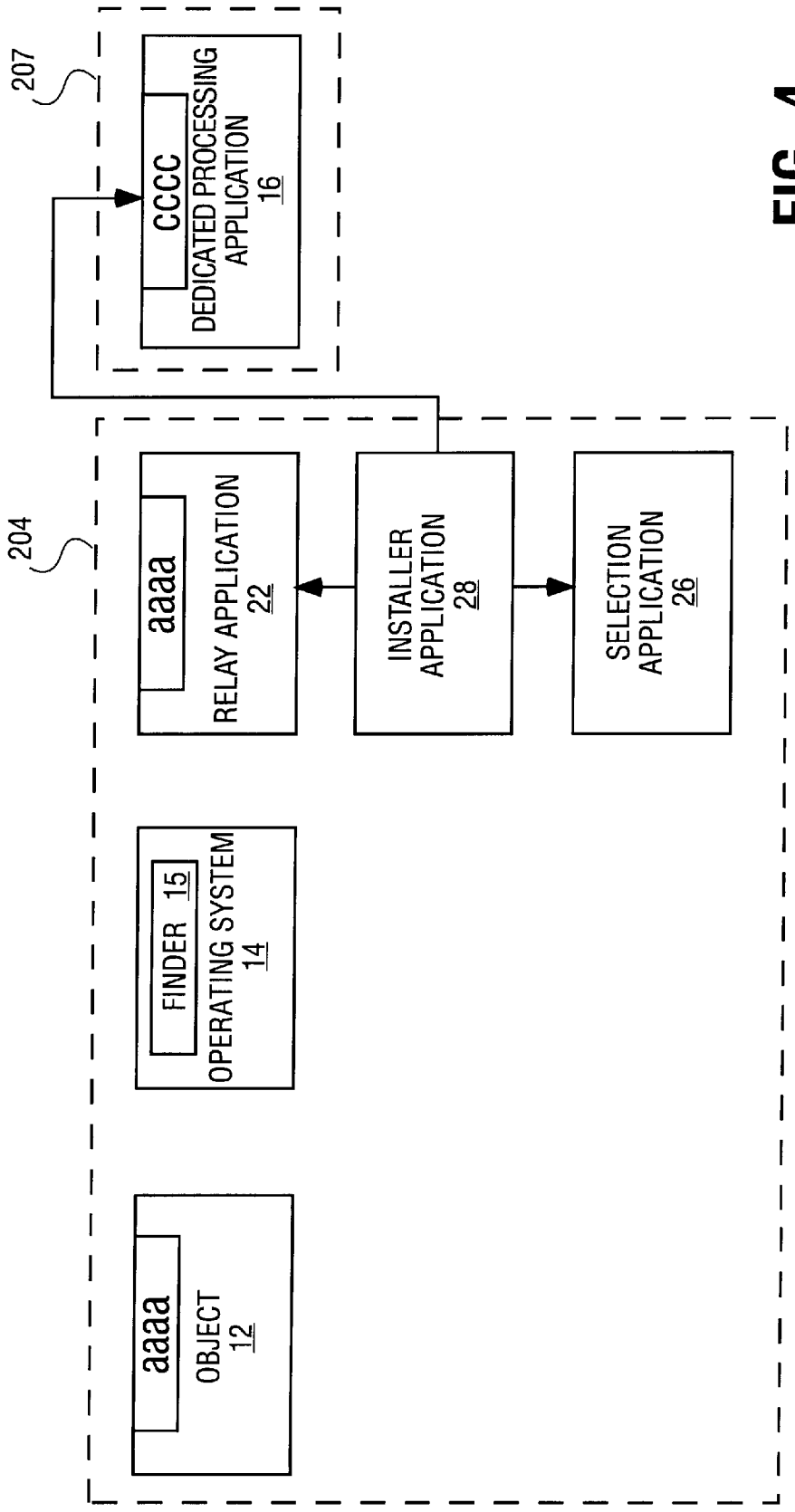

207
CCCC
DEDICATED PROCESSING APPLICATION 16
204
aaaa
RELAY APPLICATION 22
INSTALLER APPLICATION 28
SELECTION APPLICATION 26
FINDER 15
OPERATING SYSTEM 14
aaaa
OBJECT 12

FIG. 4

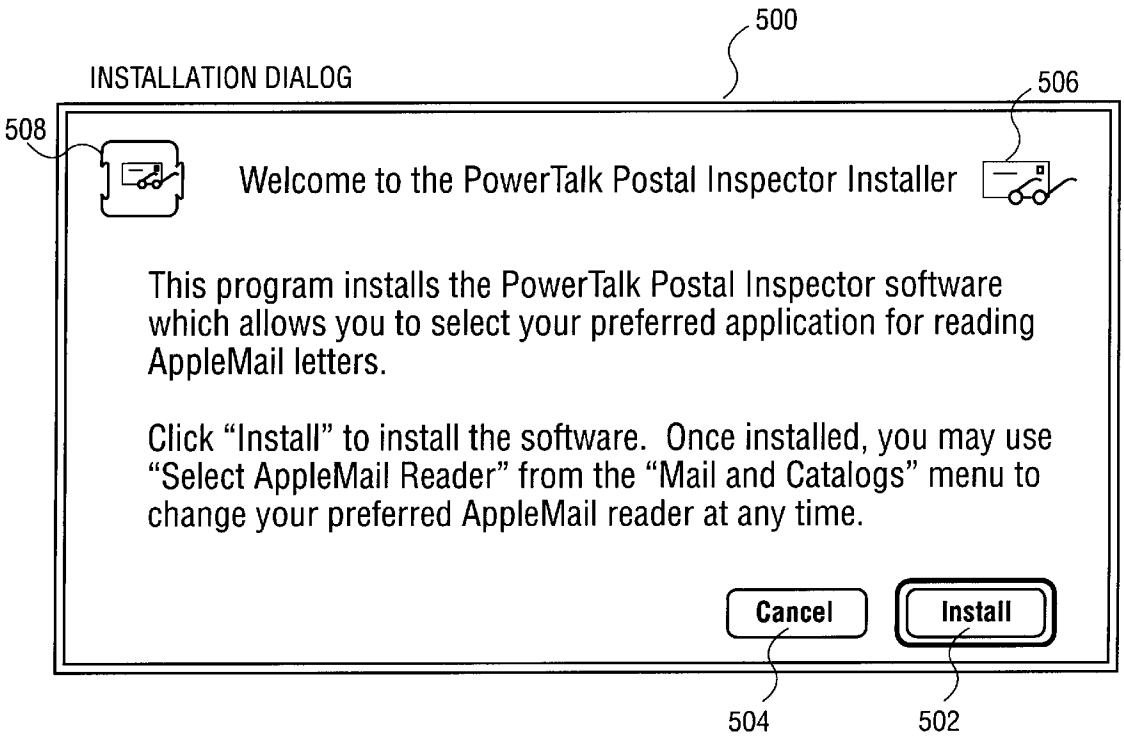

500
INSTALLATION DIALOG
506
508
Welcome to the PowerTalk Postal Inspector Installer
This program installs the PowerTalk Postal Inspector software which allows you to select your preferred application for reading AppleMail letters.
Click "Install" to install the software. Once installed, you may use "Select AppleMail Reader" from the "Mail and Catalogs" menu to change your preferred AppleMail reader at any time.
Cancel
Install
504
502

FIG. 5

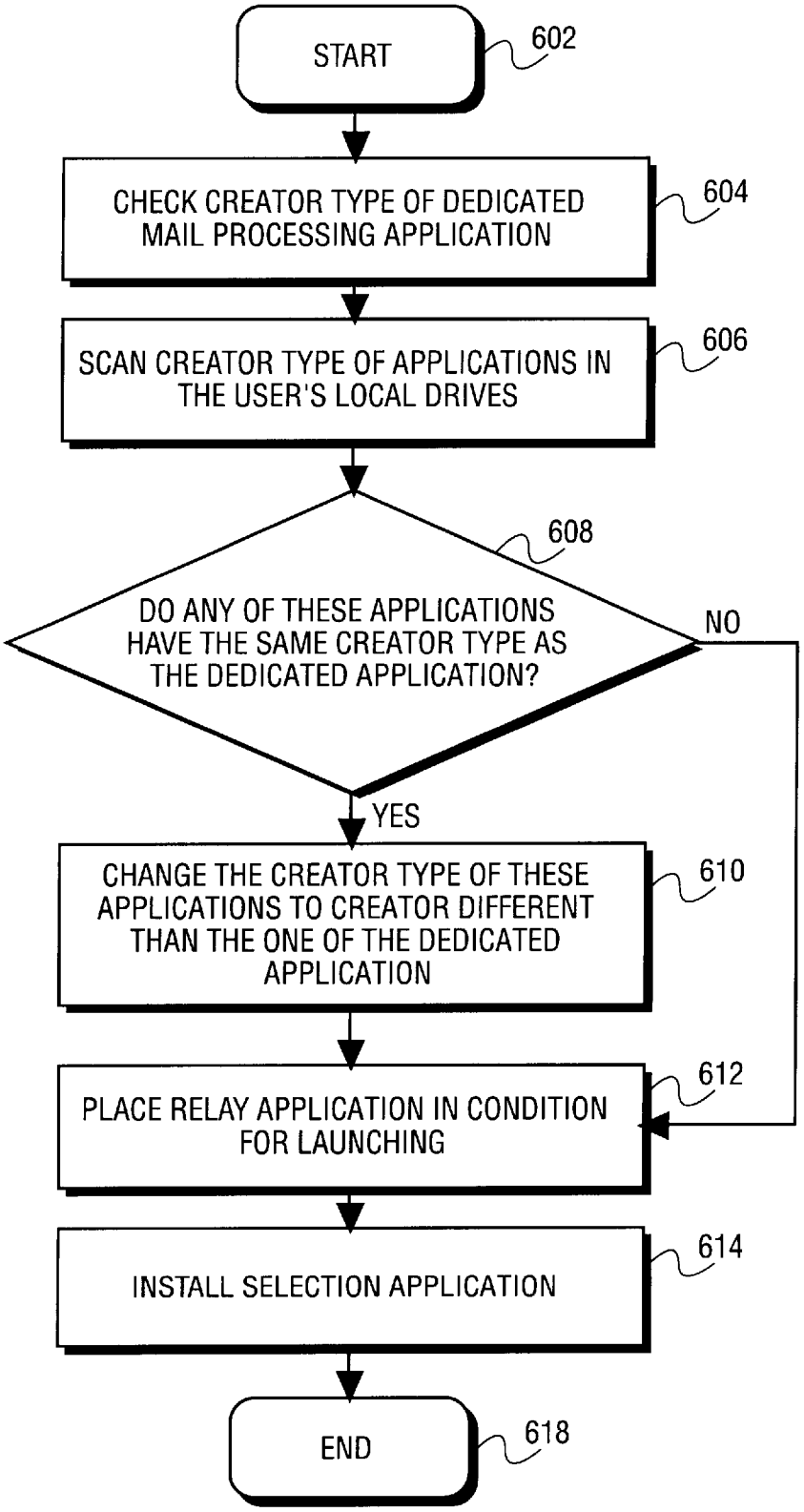

START
602
CHECK CREATOR TYPE OF DEDICATED MAIL PROCESSING APPLICATION
604
SCAN CREATOR TYPE OF APPLICATIONS IN THE USER'S LOCAL DRIVES
606
DO ANY OF THESE APPLICATIONS HAVE THE SAME CREATOR TYPE AS THE DEDICATED APPLICATION?
608
NO
YES
CHANGE THE CREATOR TYPE OF THESE APPLICATIONS TO CREATOR DIFFERENT THAN THE ONE OF THE DEDICATED APPLICATION
610
PLACE RELAY APPLICATION IN CONDITION FOR LAUNCHING
612
INSTALL SELECTION APPLICATION
614
END
618

FIG. 6

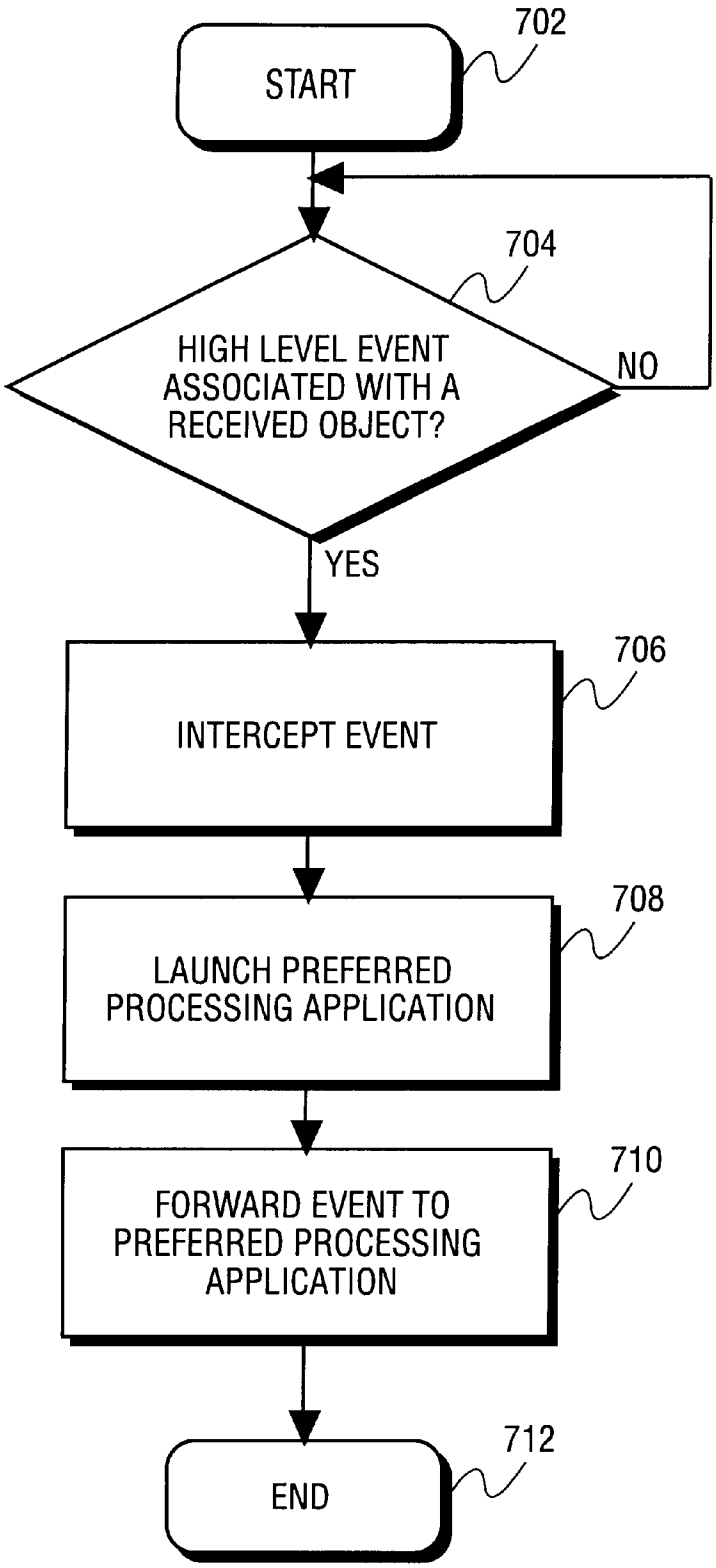

702
START
704
HIGH LEVEL EVENT ASSOCIATED WITH A RECEIVED OBJECT?
NO
YES
706
INTERCEPT EVENT
708
LAUNCH PREFERRED PROCESSING APPLICATION
710
FORWARD EVENT TO PREFERRED PROCESSING APPLICATION
712
END

FIG. 7

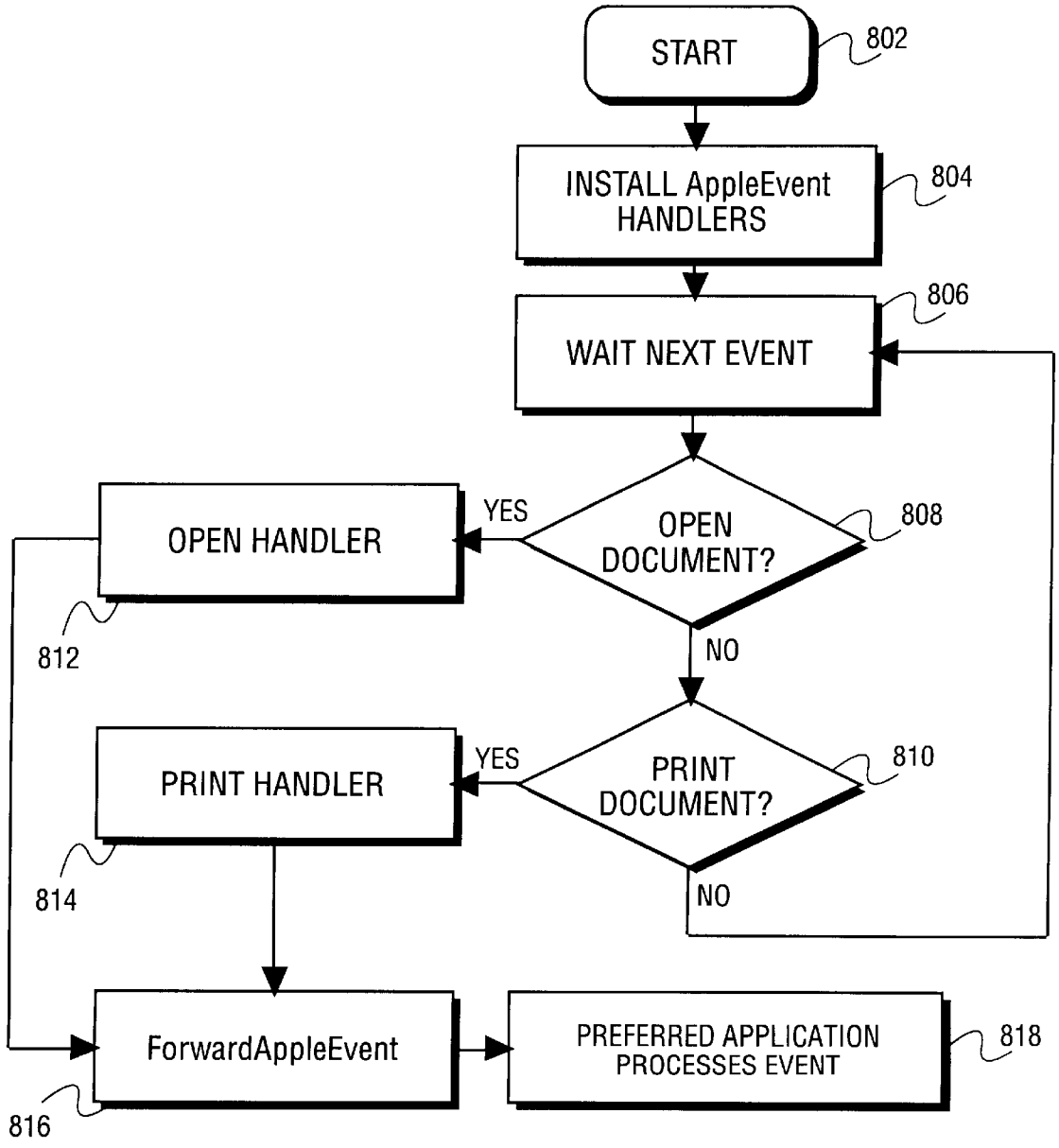

START
802
INSTALL AppleEvent HANDLERS
804
WAIT NEXT EVENT
806
OPEN DOCUMENT?
808
YES
OPEN HANDLER
812
NO
PRINT DOCUMENT?
810
YES
PRINT HANDLER
814
NO
ForwardAppleEvent
816
PREFERRED APPLICATION PROCESSES EVENT
818

FIG. 8

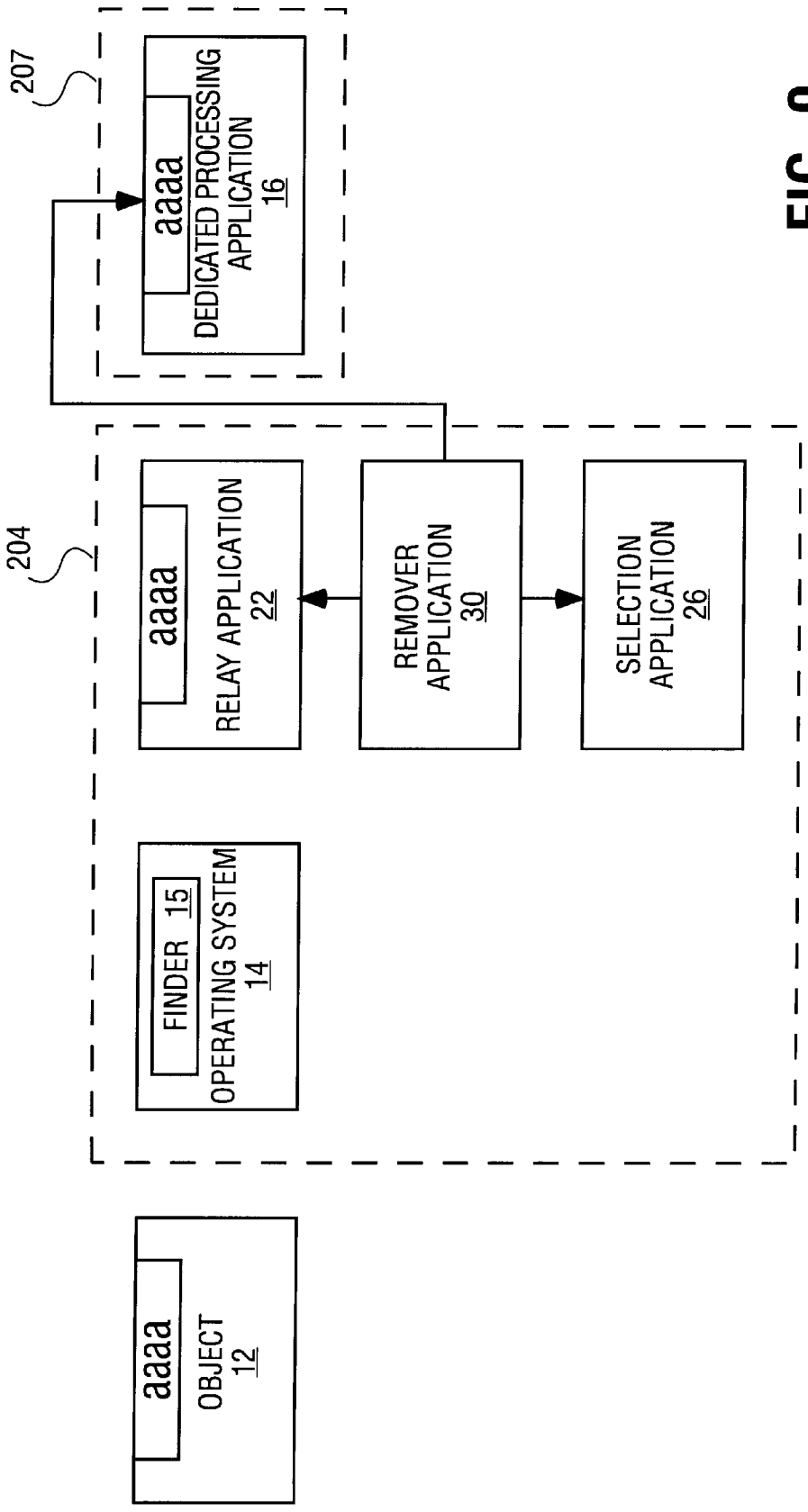

207
aaaa
DEDICATED PROCESSING APPLICATION 16
204
aaaa
RELAY APPLICATION 22
REMOVER APPLICATION 30
SELECTION APPLICATION 26
FINDER 15
OPERATING SYSTEM 14
aaaa
OBJECT 12

FIG. 9

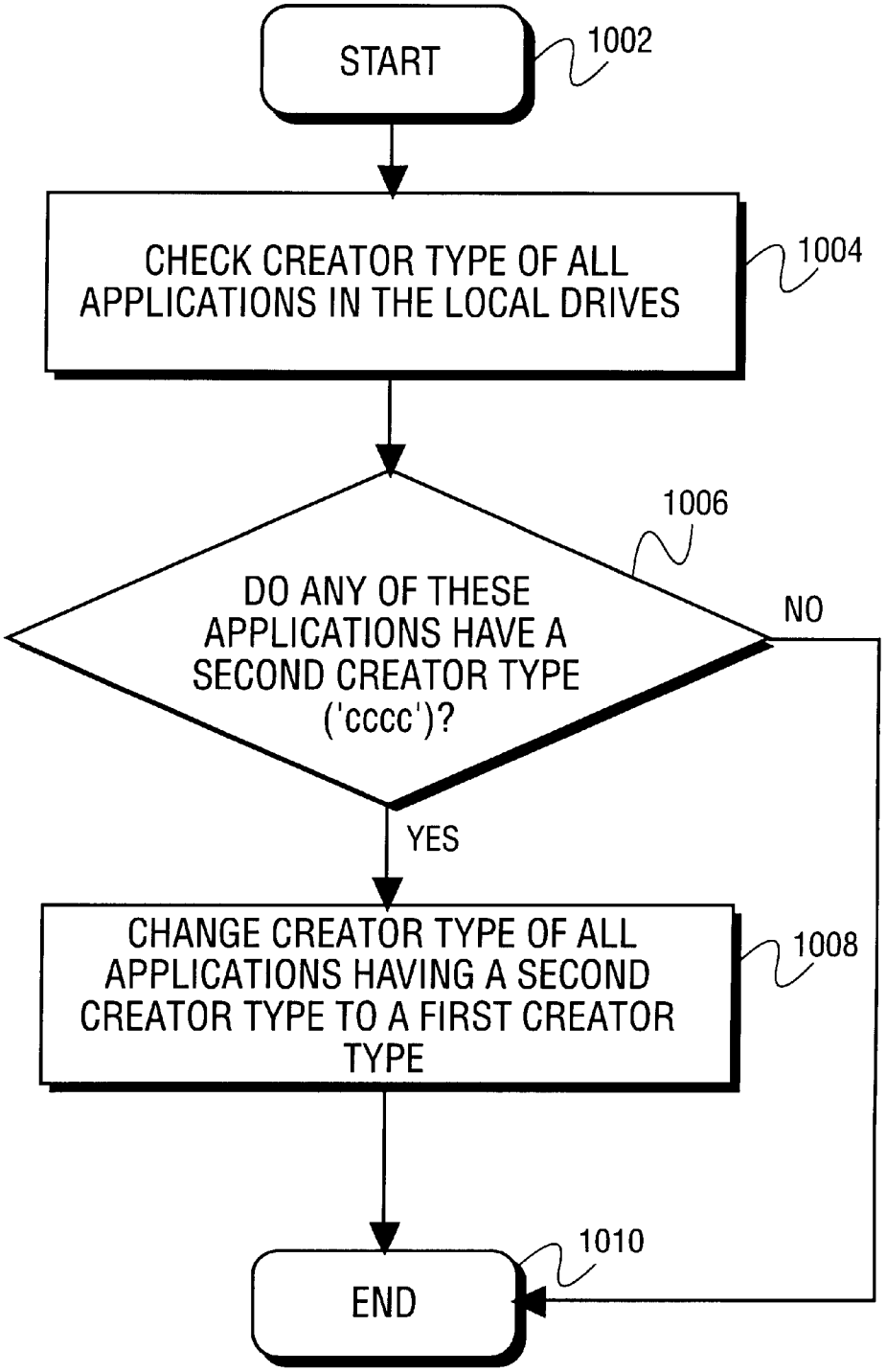

START
1002
CHECK CREATOR TYPE OF ALL APPLICATIONS IN THE LOCAL DRIVES
1004
1006
DO ANY OF THESE APPLICATIONS HAVE A SECOND CREATOR TYPE ('cccc')?
NO
YES
CHANGE CREATOR TYPE OF ALL APPLICATIONS HAVING A SECOND CREATOR TYPE TO A FIRST CREATOR TYPE
1008
END
1010

FIG. 10

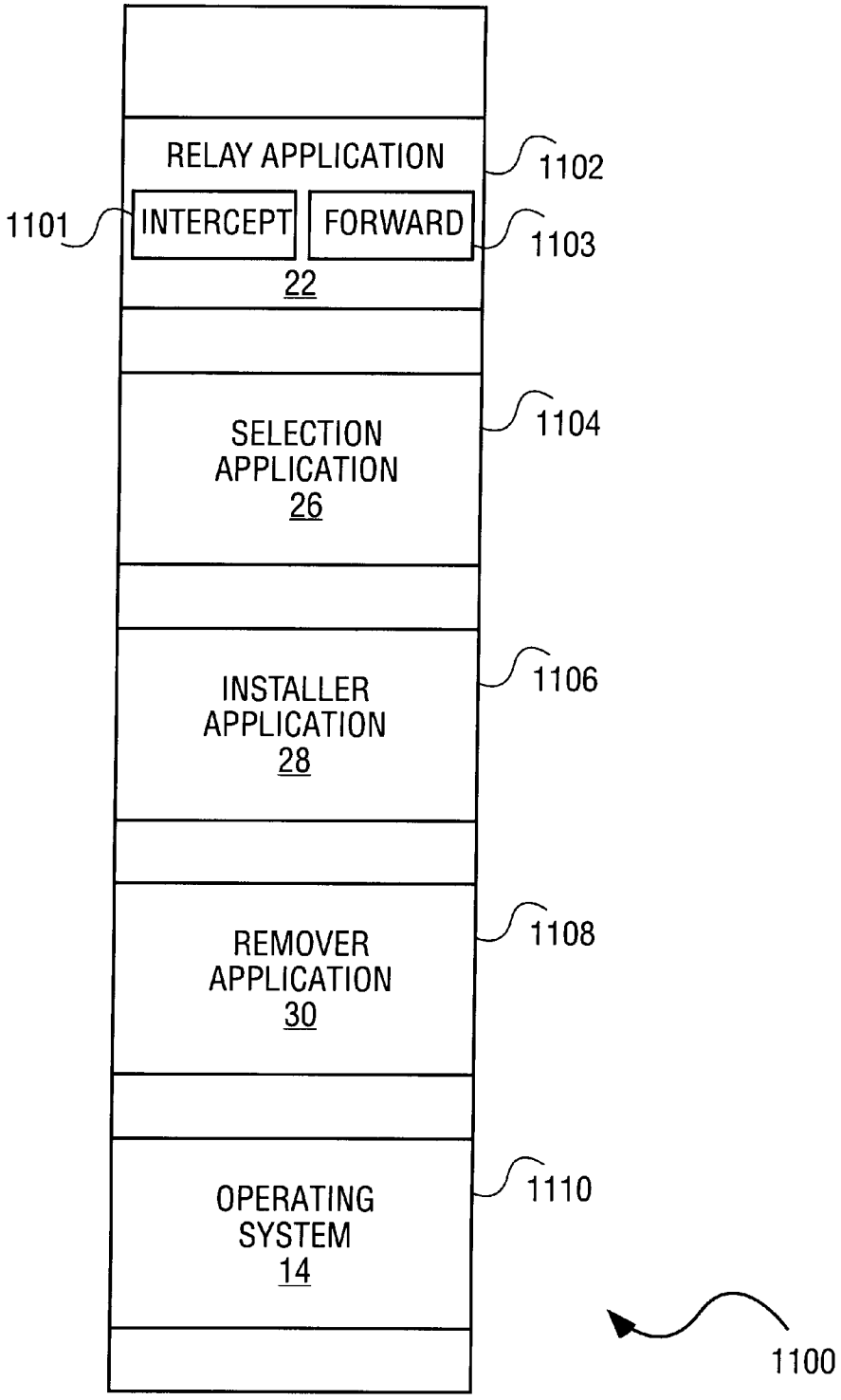

RELAY APPLICATION
1102
1101
INTERCEPT
FORWARD
1103
22
1104
SELECTION APPLICATION 26
1106
INSTALLER APPLICATION 28
1108
REMOVER APPLICATION 30
1110
OPERATING SYSTEM 14
1100

FIG. 11

METHOD AND APPARATUS FOR RELAYING EVENTS INTENDED FOR A FIRST APPLICATION PROGRAM TO A SECOND APPLICATION PROGRAM

BACKGROUND OF THE INVENTION

(1) Field of the Invention

The present invention relates to the field of computer systems. More particularly, the present invention pertains to a computer system provided with a system for reading files containing data, such as an electronic mail system.

(2) Description of the Related Art

As it is well known, most modern computer systems are provided with the capability of electronically communicating with other computer systems for allowing users to share information. Electronic mail, for example, offers such capability of communicating by providing the means for transmitting, receiving, and processing user-generated messages between computer systems. Electronic mail, or e-mail, functions similarly to a post office mail system, by receiving letters from a sender and further transmitting these letters to an addressee. Electronic mail systems also provide features allowing other information to be transmitted from one computer system to another, such as files or other data typically referred to as enclosures. While typical prior art electronic mail systems have surpassed the capabilities offered by conventional post office mail systems, by providing capabilities for forwarding mail messages, responding to mail messages, opening messages, printing messages, removing enclosures (files) included with the messages, etc., such electronic mail systems suffer from several disadvantages.

One disadvantage of prior art electronic mail systems is that they typically require the use of a dedicated electronic mail application program for reading and otherwise processing messages. For example, in some circumstances the recipient of a message must read electronic mail documents with the same type of application that the sender used to create the document. Users of computer systems such as, for instance, Apple® Computer, Inc., located in Cupertino, Calif., may prefer to read AppleMail™ documents, which are documents created by an AppleMail application program (dedicated creator application), with an application program other than AppleMail. Such a preferred application program may be simply a text editor or a more sophisticated program, capable of translating AppleMail documents, such as ClarisWorks or BBedit. Similarly, users may desire to open or print a document created by a first application program (e.g., Microsoft Word) by using a second application program (e.g., WordPerfect).

Conventional computer systems such as Apple systems provide an application program such as MacLink® Plus/PC for translating files having a first format to files having a second format. For example, files having formats compatible to DOS operating systems can be translated into files compatible with the MacIntosh or Apple operating system. For more information related to the MacLink® translator please see MacLink® Plus PC user manual. Similarly, Apple Systems provide an application program called MacIntosh Easy Open to simplify opening documents created with programs that are not currently installed in the system's hard disk. The Easy Open application program recognizes different file types and uses built-in translators to help convert files and open them in an appropriate application that is present in the system. For more information related to the MacIntosh Easy Open, please see chapter 5 of the publication MACWORLD

SYSTEM 7.5 BIBLE, 3rd Edition, published by IDG Books Worldwide, Inc. Present electronic mail systems, however, do not support the selection of a preferred mail reader application different than a dedicated reader application such as AppleMail reader in Apple systems and redirect an event to such preferred mail reader application. In electronic mail, and other application programs which transmit data, the sender does not necessarily know the capabilities of the recipient. In the traditional post office, all that is required is that the sender knows that the recipient is able to read. Similarly, electronic mail users should be able to use any type of electronic mail program, word processing or text editor that they choose, irrespective of that used by the sender of the data. This allows users to read and/or process any type of mail documents with a preferred application with which they feel more comfortable or which they find more appropriate for their particular goals.

FIG. **1** shows a block diagram of a prior art system with a second application program **6** processing an object **2** created by a first application program **1** (e.g. reading an electronic mail document). The object document **2** can be created by creator application program **1** in a remote computer system or the local computer system. The object document **2** has a creator type **3** 'aaaa' which corresponds to the creator type 'aaaa' of the creator application program **1**. Computer systems such as the Macintosh® of Apple Computer® can identify an application program through the "signature" of the application. The signature is a unique four-character sequence such as 'aaaa.'

Whenever an application program **1** creates a document, the application program **1** assigns the document a creator type and a file type. Typically, an application program sets its signature as the document's creator type **3**. When a user double-clicks a document or selects it and chooses "Open" or "Print" from the Finder's file menu, a Finder **5** reads the creator field **9** of that file to find the document's creator type **3**. Finder **5** is an application that works with the operating system software **4** to keep track of files and to manage the user's desktop display. After determining the creator type **3**, Finder **5** searches for an application program with a signature corresponding to the same creator type as the one found in the creator field **9** of the object selected or clicked. When Finder **5** finds the application program **6**, Finder **5** may launch this application program **6** or call the Process Manager to activate the application program. The Process Manager creates a partition of memory for the respective application program, loads the code into this partition, and performs some operations in preparation for launching. The Process Manager then returns control to Finder **5**. For more information regarding Apple systems and identification of applications by signatures see the publication INSIDE MACINTOSH, MACINTOSH TOOL BOX ESSENTIALS (1992) available from Addison-Wesley Publishing Company. Similarly, conventional mail systems have associated mail information with an application program that created them by assigning to each mail document a signature or creator type corresponding with the signature of the creator application program which created that particular mail document.

The creator type of the creator application **1** and of the object **2** is used by the Finder **5** to determine what application, in a local system, can process an event associated with the received object **2**. An event is defined as the means by which an Event Manager communicates information about user actions, changes in the processing status of the application, and other occurrences that require a response from an application. The Event Manager represents

the collection of routines that an application can use to receive information about actions performed by the user, to receive notice of changes in the processing status of the application, and to communicate with other applications.

Typically, upon the generation of an event associated with object **2**, such as double-clicking on a file in the Finder **5**, the Finder **5** sends a request to the Operating System **4** which, in turn, references a table containing a creator. The table is stored in a non-volatile storage media or system memory storing all the 4-byte creator types or signatures of the applications that are present in the system. For each creator type in the table, a dedicated processing application program **6** is referenced. For example, when a request or event is sent to open a document that has the creator type 'aaaa,' the Finder will determine whether the 'aaaa' creator type is present in that table. Assuming that the creator type is present in the table, the Finder then references and alerts the dedicated processing application **6** that a request to open a document is pending. For example, assuming that the creator application **1** is an AppleMail application having the signature 'aaaa,' the source object **2** will have the creator type 'aaaa.' Upon receipt of an event associated with object **2**, such as open document or print document, the Operating System **4** will forward the respective event to the dedicated processing application **6** which can be an AppleMail application or any application of the same type as the dedicated creator application program **1**. The dedicated processing application **6** will then process the requested event allowing a user, for example, to read the object **2**, in the case where the event associated with the object **2** is an open document event.

However, according to the system illustrated in FIG. **1**, the user is typically not able to use a preferred local processing application such as e-mail reader or word processor, other than the dedicated processing application because the Finder **5** typically forwards the event associated with object **2** to the dedicated processing application **6** or a copy thereof. As such, it is desirable to provide a method and apparatus having the capability to forward events associated with an object created by a dedicated creator application to a preferred processing application, such that desired events associated to that object can be processed by the preferred processing application program.

BRIEF SUMMARY OF THE INVENTION

The present invention provides for a computer-related method for processing, with a preferred processing application program having a preferred identifier, an event associated with an object generated by a dedicated creator application program having a dedicated identifier. The method includes the following steps: a) receiving the event; b) a relay application program intercepting the event; and c) the relay application program forwarding the intercepted event to the preferred processing application program.

The present invention also provides for a computer system for processing, with a preferred processing module having a preferred identifier, events associated with an object generated by a dedicated creator module having a dedicated identifier. The events directed to the dedicated processing module have a dedicated identifier. The computer system includes a processor, a memory coupled to the processor, an interactive input-output system coupled to the processor, and a display coupled to the processor. The computer system further includes: a module for relaying the event, associated with an object generated by the dedicated processing application, to the preferred processing module, the module for relaying the event being coupled to the processor; a module for selecting the preferred processing module, the module for selecting being coupled at an input thereof to the preferred processing module, and that an output thereof to the module for relaying; a module for installing the module for relaying and the module for selecting, the module for installing being coupled, at an output thereof, to the module for relaying and to the module for selecting; and a module for decoupling the module for relaying and the module for selecting. The module for relaying is adapted to intercept an event associated with an object generated by the dedicated creator module. The module for relaying is also adapted to forward the event intercepted to the preferred processing module.

The present invention further includes a computer system for processing, with a preferred processing application program having a preferred identifier, events associated with objects generated by a dedicated creator application program. The events are directed to a dedicated processing application destination with a dedicated identifier. A dedicated creator application program has a dedicated identifier. The computer system includes a processor, a computer-readable storage medium coupled to the processor, an interactive input/output system coupled to the processor, and a display coupled to the processor. The computer-readable storage medium includes: a first region storing a relay application program for relaying an event, associated with an object generated by the dedicated creator application program, to the preferred processing application program; a second region storing a selection application program for selecting the preferred processing application program; a third region storing an installation program for installing the relay application program and the selection application program; and a fourth region storing a removing application program for de-installing the relay and the selection application programs. The relay application program has a first program portion directed to intercept the event associated with an object generated by the dedicated creator application program. The relay application program further has a second program portion directed to forward the intercepted event to the preferred processing application program.

BRIEF DESCRIPTION OF THE DRAWINGS

The features, aspects, and advantages of the present invention will become more fully apparent from the following Detailed Description, appended claims, and accompanying drawings in which:

FIG. **1** shows a block diagram of a prior art computer system for processing objects with a first creator identifier by an application program having the same creator identifier, e.g. reading electronic mail documents;

FIG. **2** shows a block diagram of a computer system on which an embodiment of the present invention may be implemented;

FIG. **3** is a block diagram representing the operation of a computer system with an electronic mail system in one implementation of the present invention;

FIG. **4** is a block diagram illustrating the installation operation of the relay and selection application programs of the computer system in an implementation of the present invention;

FIG. **5** illustrates an installation dialog box for the installation of the relay application of the computer system in an implementation of the present invention;

FIG. **6** illustrates a process flow diagram of the installation process performed by the installer application in the computer system in an implementation of the present invention;

FIG. **7** shows a high-level flowchart diagram illustrating a process of the relay application in an implementation of the present invention;

FIG. **8** illustrates a more detailed flowchart diagram of the process of the relay application;

FIG. **9** illustrates a block diagram of the computer system in an implementation of the present invention with the remover application activated;

FIG. **10** shows a flowchart diagram illustrating the process of removal in the computer system in an implementation of the present invention; and

FIG. **11** illustrates a memory storing the application programs in an implementation of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, specific steps, procedures, command options, command items, and other specifics are set forth in order to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that the present invention may be practiced without these specific details. In other instances, well-known systems and methods are shown in diagrammatic block or flow diagram form in order not to unnecessarily obscure the present invention.

Referring to FIG. **2**, a computer system **200**, in which an event relaying scheme such as the application program of the present invention is incorporated. The computer system **200** comprises a bus **201** for communicating information and a processor **202**, coupled to bus **201**, for processing information. System **200** further comprises a random access memory (RAM) or other dynamic storage device **204** (referred to as main memory), coupled to bus **201**, for storing information and instructions to be executed by processor **202**. Main memory **204** may also be used for storing temporary variables or other intermediate information during execution of instructions by processor **202**. Computer system **200** also comprises a read only memory (ROM) and/or other static storage device **206** coupled to bus **201** for storing information and instructions for processor **202**, and a mass storage device **207** such as a magnetic disk or optical disk and its corresponding disk drive. Mass storage device **207** is coupled to bus **201** for storing information and instructions. Computer system **200** may further be coupled to a display device **221**, such as a cathode ray tube (CRT) or liquid crystal display (LCD) via bus **201**, for displaying information to a computer user. Computer system **200** is also coupled to an alphanumeric input device **222**, including a keyboard, for communicating information and command selections to processor **202**. Direction information and command selections to processor **202** can be input via a cursor control device **223**, such as a mouse, a trackball, stylus, or cursor direction keys, coupled to bus **201**. Another device which may be coupled to bus **201** is hard copy device **224** which may be used for printing instructions, data, or other information on a medium such as paper, film, or similar types of media. While any or all of the components of system **200** and associated hardware may be used in a preferred embodiment, it can be appreciated by one skilled in the art that any other type of configuration of the system may be used for various purposes.

System **200** may further be coupled to a network interface **225** which provides an interface with a network backbone such as **230**. This network **230** may be one of numerous networking systems commercially available, such as the AppleTalk® brand network available from Apple® Computer, Inc. of Cupertino, Calif., Ethernet, or Token Ring networks as are generally commercially available. Such a network provides an interface among many systems and, therefore, system **200** may communicate with a second system such as **250**, shown in FIG. **2**, using well-known electronic mail techniques for the transmission and reception of electronic messages between systems.

In the preferred embodiment, computer system **200** is one of the Macintosh® family of personal computers such as the Macintosh® Quadra™, Macintosh® Performa™, or PowerMac® brand personal computers manufactured by Apple® Computer, Inc. of Cupertino, Calif. (Apple, Macintosh, Quadra, Performa, and PowerMac are trademarks of Apple Computer, Inc.). Processor **202** can be one of the 68000 family of microprocessors, such as the 68030 or 68040 or PowerPC such as the 601 or 604 manufactured by Motorola, Inc. of Schaumburg, Ill.

Note that the following discussion of the user interface display methods and apparatus of the preferred embodiment discussed herein will refer specifically to a series of routines which are compiled, linked, converted to object code in computer system **200**, and loaded into main memory **204** for execution during system run-time. It can be appreciated by one skilled in the art, however, that the method and computer systems according to the present invention may be implemented in special purpose hardware devices, such as discrete logic devices, large scale integrated circuits (LSI's), application-specific integrated circuits (ASIC's), or other specialized hardware. It can thus be appreciated by one skilled in the art that the description herein has equal application to other computer systems having similar functions.

FIG. **3** shows a block diagram representing a computer system having an electronic mail system according to the present invention and implementing the process according to the present invention. The computer system according to the present invention includes an installer application program **28**, a relay application program **18**, a select application program **26**, and a remover application program **30**. Any and/or all of these functional blocks or data may be stored in main memory **204** (shown in dotted lines) at any given time according to the need to have the particular block reside in the main memory operated upon (e.g. read or executed). The installer application program **28** can change the creator type of all local copies of the dedicated mail processing application (e.g. block **16**) in the local system from its original creator type 'aaaa' to another creator type 'cccc.' A dedicated processing application **16** or a local copy thereof is an application which can process an object generated by the dedicated creator application program **10**. That is, the dedicated creator application **16** or the local copy thereof has the same creator type as dedicated creator application program **10**. Relay application **18**, which assumes the creator type 'aaaa' of the dedicated processing application **10**, launches the preferred mail processing application **20** when a certain type or types of event/events is/are received. Relay application **18** then forwards the event to the preferred processing application **20**. Selection application **26** allows the user to select the preferred processing application **20** via a graphic user interface (GUI) (not shown). While the selection of the preferred processing application **20**, in a preferred implementation, is done with a GUI, text interfaces can be used as well. The remover application **30** allows the user to delete the relay application **18** and the selection application **26** from the system. This application restores back to 'aaaa' the creator type of all local copies of the dedicated processing application **16**, which have been assigned the alternate creator type 'cccc' during installation.

As one can see from FIG. **3**, in operation, an object **12** having a first creator type 'aaaa' is processed by the operating system **14**. This object may include a mail document transmitted by a first system **250** to the local system **200**, or any other object created by another dedicated creator application **10**. If a user selects the object **12** by means of the selection GUI, an event associated with the object **12**, such as a print document or open document, is generated. As the creator type of the relay application **20** has been modified to 'aaaa', which is the creator type of the dedicated mail processing application **16**, finder **15** causes this event to be received by the relay application **18**. The relay application **18** then forwards the event associated with object **12** to a preferred destination application **20**, instead of forwarding the event associated with the object to the dedicated mail processing application **16**.

FIG. **4** is a block diagram illustrating installation of the relay application **22** and of the selection application **26** in an embodiment of the present invention. Installer application **28** is an application program designed to prepare the user's system **200** for installation and to copy the files required to run the relay application **22** and the selection application **26**. The preparation of the user system **202** includes searching all non-volatile storage devices (e.g. **207**) for all copies (e.g. **16**) of the dedicated mail processing application and changing the creator type in the file systems. The files installed by this processor include the relay application **22** and the selection application **26**. As explained above, installer **28** changes the creator type of all local copies of the dedicated mail processing application **16** from 'aaaa' to 'cccc.' In so doing, the computer system and the process of the present invention ensure that during system operation, the relay application program **22** will forward an event associated with object **12** to the preferred destination application **20** when configured by the user. As one can see, the relay application **22** assumes the creator type 'aaaa' of the dedicated processing application **16** in order to intercept events directed to the dedicated processing application program **16**.

The installation of the relay application is performed by an installer application **28** at the request of a user. A user can initiate the installation of the relay application by means of an installation dialog box **500** illustrated in FIG. **5**. The explanatory dialog illustrated in FIG. **5** is a preferred non-limiting implementation for installing the relay application. A text implementation can be used as well. The dialog box **500** includes an "Install" button **502**, a "Cancel" button **504**, the icon **506** representing a selected or de-selected preferred processing application and icon **508** representing a selected or de-selected relay application. If the user selects the "Install" button **502**, the installer application will be activated according to the process illustrated in conjunction with the flowchart diagram of FIG. **6**.

The installation process **600** illustrated in FIG. **6** starts at block **602** upon a user's activation of the "Install" button of the dialog box **500**. At block **604**, the installer will check the creator type of the dedicated mail processing application **16**. This step is performed, assuming that the computer system according to the present invention can have more than one mail processing application and only one such application, at one time, is assigned as the dedicated mail processing application **16**. In case that the computer system has only one dedicated mail processing application **16**, the step of checking the creator type of the dedicated mail processing application, performed at block **604**, can be skipped and the installer can go to step **606**. At block **606**, the installer scans the user's local drives (e.g. **207**) for all copies of the dedicated mail processing application **16**. In this particular example, installer **28** scans the local drives for all instances of applications having the creator type 'aaaa.' Installer **28** then determines, at decision block **608**, if any of the applications in the user's local drives have the same creator type as the dedicated mail processing application **16**. If the local drives coupled to the user's system **200** contain applications that have the same creator type as the dedicated mail processing application, then the installer changes the creator type of these applications to a second creator type 'cccc,' different from creator type 'aaaa,' at block **610**. In an Apple® system, the installer also fixes the bundle resource for the dedicated mail processing application **16** so that its icon matches its new creator type 'cccc.' A resource is defined as any data stored according to a defined structure in a resource fork of a file. A bundle resource associates all of the resources used by the Finder to an application. In particular, a bundle resource associates an application and its documents with their corresponding icons.

The installer then places the relay application in condition for launching by placing the relay application in the Extension's Folder of the startup disk at block **612**. The Extensions Folder, located in the System Folder, holds code that is not part of the basic system software, but that provides system-level services, such as printer drivers and system extensions among other things. The items found in the Extensions Folder, including the relay application **18**, are started up every time the Finder **15** starts up the system.

Accordingly, in one embodiment of the present invention, relay application **18** will be launched by the Finder **15** at system startup time. However, it is conceivable that users can set up their system such that the relay application **18** may be placed at another location where this application program can be launched conveniently at some predetermined time or when required. At block **614**, installer **28** installs selection application program **26** by placing selection application program **26** in the Mail and Catalogs folder of the Apple Menu Items folder of the startup disk. The Mail and Catalogs folder, just like the Extensions folder, is a predetermining place in the system. Then, the explanatory dialog **500** illustrated in FIG. **5** is dismissed and the user receives a message noting whether or not the installation was successful.

Once relay application **18** and selection application **26** are installed, selection application **26** can be invoked at any time from the Mail and Catalogs folder, in case a user wishes to change preferred processing application **20**. Selection application program **26** can present a movable modeless dialog box which provides for changing a current processing application to a preferred processing application.

FIG. **7** shows a flowchart diagram illustrating the operation of relay application **18**. Relay application **18** is launched at startup initialization, at block **702** in FIG. **7**. While this application is launched at startup, it can be subsequently quit and relaunched. At decision block **704**, the relay application checks whether there are any high level events (e.g. "open document" or "print document"), associated with the received object, sent to relay application **18** by the Finder **15**. If an event is received, then relay application **18** intercepts the event at block **706**. The respective event is intercepted by relay application **18**, because the relay application has the same creator type (e.g. 'aaaa') as the creator type of the dedicated mail processing application **16**. As previously discussed, events associated with an object created by a creator processing application **10** are not intercepted by local copies of the dedicated mail processing application **16**, because the installer has previously changed the creator type of all copies of the dedicated application to a second creator

type, as shown in FIG. **6** at block **610**. Process **700** then goes to block **708** where it launches the preferred processing application **20** upon receipt of an open or print document event. Relay application **18** knows what is the selected preferred processing application **20** by referring to a file called "preferences file" where aliases of the preferred processing applications and the signature of these applications are stored. Then, relay application **18** changes the target of the open or print document event to the preferred mail processing application **20**. Finally, at block **710**, the open document or print document event will be forwarded by relay application **18** to the preferred mail processing application **20**.

FIG. **8** illustrates graphically a flowchart of the relay application process for Apple® brand Computer Systems. After startup initialization, at block **802**, relay application **18** proceeds to install AppleEvent handlers at block **804**. Then the relay application enters its event loop at block **806**. At this block, as is typical in event handlers, the next event from the event queue is retrieved. The event loop of the relay application filters only on high level events such as "open" document at decision block **808** and "print" document events at decision block **810**. If an open document event or print document event has been received, then the open document event handler **812** or the print document event handler **814** passes control to the ForwardAppleEvent function at block **816**. The ForwardAppleEvent function resolves the alias or pointer to the preferred mail processing application **20**, stored in the "preference file" which contains an alias to the preferred mail processing application **20** and its signature (creator ID). The ForwardAppleEvent function changes the target address of the AppleEvent received to the preferred mail processing application and then resends the event. At block **818**, control is transferred to the preferred mail processing application **20** wherein the event forwarded to it will be serviced.

FIG. **9** illustrates a block diagram of the computer system according to the present invention with Remover application **30** activated. Remover application **30** is a standard application which acts upon the relay application **18** and the selection application **26** and de-installs or deactivates these applications, essentially performing the reverse of the operations performed during installation. Also, Remover application **30** acts upon the copies of the dedicated mail processing application **16**, having the creator type 'cccc,' and replaces this creator type with the original creator type 'aaaa.'

FIG. **10** shows a flowchart diagram illustrating the process of removing an application according to the present invention. As one can see, part of the removal process includes searching local drives, at block **1004**, for copies of dedicated mail processing application **16** having creator type 'cccc.' At block **1006**, remover application **30** determines whether any of the applications of the local drives have 'cccc' for creator type, and at block **1008**, remover application **30** changes the creator type of all the applications having the second type 'cccc' to the creator type 'aaaa,' which in this case, corresponds to the original creator type of the dedicated mail processing application **16**. The remover then fixes the dedicated mail processing application's bundle resource so that its icon matches its new creator type 'aaaa.' The Remover then deletes the relay application and the selection application.

FIG. **11** shows a memory device storing the application programs according to the present invention, together with the operating system. As one can see, a memory, **1100** stores in a first region **1102** a relay application **22**. The relay application program has a first program portion **1101** directed to intercepting the event associated with an objected generated by the dedicated creator application program. The relay application program further has a second program portion **1103** directed to forward the intercepted event to the preferred processing application program. Memory **1100** further includes, in a second region **1104**, a selection application program **26** for selecting the preferred processing application program. The memory **1100** further stores in a third region **1106** an installation application program for installing the relay application program and the selection application program. Furthermore, the memory **1100** stores in a fourth region **1108** a remover application programmed for de-installing the relay and selection application programs. In addition, the memory **1100** stores in a fifth region **1110** an operating system program. The operating system program performs the customary functions that operating systems perform in computer systems. In addition, the operating system shown in FIG. **11** is responsible for activating or launching the relay application program stored in the first region.

As explained above, the present invention can be implemented in special purpose hardware devices, such as discrete logic devices, large scale integrated circuits (LSI's), and application-specific integrated circuits (ASIC's). In such a computer system, the applications of the present invention could be implemented in hardware modules coupled to each other as shown in FIGS. **3**, **4**, and **9**.

In the foregoing specification, the invention has been described with reference to specific embodiments thereof. It win however be evident that various modifications and changes can be made thereto without departing from the broader spirit and scope of the invention as set forth in the appended claims. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense. Therefore, the scope of the invention should be limited only by the appended claims.

What is claimed is:

1. A computer-related method for processing events said method comprising:

receiving an event associated with an object generated by a dedicated creator electronic mail application program, said dedicated creator electronic mail application program having a dedicated identifier;

changing said dedicated identifier of said dedicated creator electronic mail processing application to an identifier different from said dedicated identifier;

intercepting said event with a relay application program, said relay application program having associated therewith said dedicated identifier; and

forwarding, with said relay application program, said intercepted event to a preferred electronic mail processing application program that has a preferred identifier.

2. The computer-related method of claim **1** wherein forwarding said intercepted event includes:

identifying said preferred processing application;

launching said preferred processing application; and

sending said event to said preferred processing application program.

3. The computer-related method of claim **1** further including the preliminary acts of:

installing said relay application program;

installing a selection application program; and

selecting, with said selection application program, said preferred processing application program,

wherein the preliminary are performed prior to the acted recited in claim **1**.

4. The computer-related method of claim **3** wherein said dedicated identifier corresponds to a first creator type of said dedicated processing application program.

5. The computer-related method of claim **4** wherein said preferred identifier corresponds to a second creator type of said preferred processing application program.

6. The computer-related method of claim **5** wherein installing said relay application comprises:

receiving an install command;

scanning local drives for all applications having said first creator type;

changing the creator type of all applications having said first creator type to a third creator type;

placing said relay application in condition for launching at a predetermined time; and

providing user accessibility to said selection application program via a selection graphic user interface (GUI).

7. The computer-related method of claim **6** wherein said predetermined time is the system initialization time.

8. The computer-related method of claim **6** wherein placing said relay application in condition for launching comprises placing said relay applications into a first location of a memory.

9. The computer-related method of claim **6** wherein providing user accessibility to said selection application via said GUI comprises placing said selection application into a second location of said memory.

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